

Review Article

Opportunities in Healthcare Quality Improvement: An Introduction

Sarwat Hussain

Professor of Radiology, University of Massachusetts, Worcester Massachusetts, USA

Abstract

Medical errors do occur daily in almost every part of the world. The significant errors include: misdiagnosis, administration of a wrong drug, improper dose of a given medication, wrong route of administration, retained surgical instruments, transplanting organs of the wrong blood type and incorrect record keeping etc. Medical negligence has widely been reported by the media in Pakistan. A local study on a small number of patients revealed prescribing error of 39 %. A local newspaper reported that medical errors are the eighth leading cause of death in this country and about 7,000 people per year are estimated to die from medication errors alone. The president of Pakistan Society of Health System Pharmacists (PSHP) stated that, "As many as 500,000 people, including women and children annually die in Pakistan due to medication errors. Based on a British Medical Journal report, in the year 2013, there were 251,454 medical error related deaths in the USA. While even one death is too many. There must always be an effort made by institutions to prevent medical errors. Healthcare quality improvement is a neglected science in the low and middle income countries (LMIC) and Pakistan. Provincial governments in Pakistan have established healthcare commissions to accredit healthcare entities. This is a step in the right direction for a journey of thousand miles.

Keywords | Health Reforms, Healthcare quality, Quality Control

Introduction

Every doctor aspires to deliver a safe and high quality care for improved patient outcome. Recent developments in Medicine has resulted in increased complexity in healthcare delivery. But the care delivery has lagged behind in keeping the patient safe and the society satisfied. Scientific literature and the lay press regularly report on the most catastrophic medical errors causing preventable injury and death to the detriment of the reputation of the medical community.^{1,2}

In the past, medical practice has been based on memory recall, long work hours and hand written paper records.³ This practice is no longer conducive high quality healthcare services, patient satisfaction and regulatory compliance. For excellence in patient

services, standards must be adopted and enabling environment created to meet or exceeded these standards. Such value can only be created continuous improvement in the processes of care delivery.⁴

In the following lines an attempt is being made to introduce quality concepts and implementation in healthcare.

Quality: Concept and Practice

Quality is generally considered subjective and not measurable. But in industry and healthcare quality is measured through attributed and indicators of products and services.

Quality was first studied as an industrial process by Shewhart in 1931 by identifying service needs of

customers, reducing variation in processes and through inspections. It was found that variance in processes lead to defective products and poor services in industry. In healthcare it causes patient harm.⁵

After the World War II, quality practices were introduced, as a primary process, in industrial manufacturing in Japan. This resulted in a universal recognition for quality and massive growth in Japanese industry.⁶ Later in the last century, implementation of error prevention systems and tools such as cockpit resource management⁷ lead to the unprecedented improvement in Aviation. This provided the best example of continuous quality improvement (CQI) in any industry. Since the late 1980's the cumulative experience of the industry is being applied in healthcare.⁸

In healthcare, there is no universally accepted definition of quality. However, a definition published by Institute of Medicine, (IOM) USA is most commonly quoted:⁹ "The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge".

The IOM identifies 6 dimensions of quality: safe, effective, patient-centered, timely, efficient, and equitable [Table 1]. These dimension not only help in quality improvement but also used as the basis for quality audit.

Table 1: Six Dimensions of Healthcare Quality (IOM)

1	Safe: Avoiding harm to patients from the care that is intended to help them.
2	Effective: Providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and misuse, respectively).
3	Patient-centered: Providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.
4	Timely: Reducing waits and sometimes harmful delays for both those who receive and those who give care.
5	Efficient: Avoiding waste, including waste of equipment, supplies, ideas, and energy
6	Equitable: Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.

Relative to quality, two other terms are commonly used: quality improvement, continuous quality improvement and quality control:

Quality Improvement (QI) is a dynamic process where planned and systematic intervention can leads to error prevention and measurable betterment of a product or service. In healthcare, QI is action based proactive system of implementation and assessment where the above 6 dimensions of quality provide milestones for improvement.⁹ When the quality improvement cycle is repeated over and over again, it is called continuous quality improvement (CQI). CQI works under the premise that opportunity for improvement exists in every process on every occasion.⁸

Quality control (QC), on the other hand, is a product oriented engineering process. In QC approach the focuses on identifying defect in a product after manufacture and deficiency in service after it has been rendered. As alluded to above, QI aims to prevent errors by refining the processes used to make a product or provide service (Table II). Naturally, QI and

CQI are more suited for healthcare as they seek to

Table 2: Comparison between Quality Assurance and Quality Control

		Quality Assurance	Quality Control
1	Definition	Set of activities for ensuring quality in the processes by which products are developed or service provided	Set of activities for ensuring quality by identifying defects in the actual products produced or service provided
2	Focus on	A proactive process that aims to prevent defects with a focus on the process used to make products or to provide service	A reactive process that aims to identify and correct finished product or service has been provided
3	How	Establish quality Management System, periodic performance audit	Finding source of quality problem through tools and equipment
4	Responsibility	Everyone involved in developing the product and rendering the service	Team responsible for finding defects and deficiencies
5	As a Tool	Managerial tool	Corrective tool
6	Orientation	Process oriented	Product oriented

prevent patient harm before it occurs.

Ethics and quality are intimately related but not synonymous with each other. Ethics is the result of internalized morality and binding values. Quality, on the other hand, relates to the perceptible and quantifiable attributes of a product or service. In the context of ethics and quality, improvement arises from three main factors: ethical attitudes, knowledge of quality sciences and application of the two aforementioned to meet quality standards. Ethics can be an engine, not the substitute for the quality improvement activities. For instance, an ethical operator, without the knowledge of the methodology of process improvement, has little chance of perpetually reaching target quality standards. On the other hand, verbatim application of prescribed processes of quality assure improvement as quality processes already incorporate elements of ethics.

Measuring Quality

Measurement is the core element to assess change. In healthcare, several statistical tools are available to measure quality. There are seven most commonly used methods to record the status of quality indi-

Table 3: The 7 Basic Statistical Tools for Quality Improvement

1	Process Control Chart	To measure how process changes over time and whether it is under control or out of control.
2	Cause and Effect Diagram	Also called Ishikawa diagrams. Common uses of this diagram are to identify all potential factors causing defects in products or variance from service delivery.
3	Check Sheet	A structured, prepared form for collecting and analyzing data; a generic tool that can be adapted for a wide variety of purposes.
4	Histogram	The most commonly used graph for showing frequency distributions, or how often each different value in a set of data occurs.
5	Pareto Chart	A bar graph that displays relative significance of each factor or data.
6	Scatter Diagram	A graph in which the values of two variables are plotted along two axes, the pattern of the resulting points reveals if any correlation present
7	Stratification	A technique where data from different sources are plotted in different colors or signs to observe patterns of those groups. Stratification can be used with any graph.

cators. These indicators are the surrogate for quality. Table III lists the tools and their application in quality assessment.¹⁰ These tools analyze and display the activities of healthcare personnel and measure processes of healthcare delivery relative to the prevailing standards.

A commonly used quality measurement tool is the Process Control Chart where variation known as ‘common cause variation’ and ‘special cause variation’ are plotted. The common cause variation are considered within tolerance limits, usually 3 standard deviations, for which no action is needed. The special cause variation points to out of control process where corrective action is required. On the process control chart the acceptable tolerance limits or variation are defined by two lines. The upper line is Upper control limit (UCL) and lower line the Lower control limit (LCL). If all data points fall within the upper and lower limit lines the process is considered to be in control. Data points falling outside the control limits indicate special cause variations requiring intervention. As quality improves, even the common cause variations diminish and the data points begin to fall closer to the central line [Figure 1].

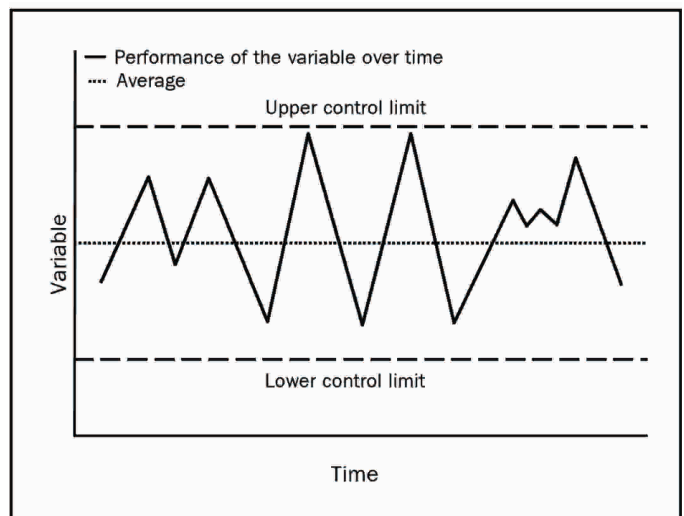


Figure 1: Example of Process Control Chart: The Upper and Lower Control Limits Indicate 3 Standard Deviations from the Mean

Explanation of other Tools is Given in Table III

Methods of Quality Improvement

Three of the most common QI methodologies in healthcare are Plan-Do-Study-Act (PDSA), Six-sigma and Lean strategies

PDSA Cycle

PDSA is the most commonly employed and easily implementable approach for improvement in healthcare (figure 2). This method involves small sample testing by “trial-and-learning”. A recommended and useable worksheet is depicted in table IV (12, 13).

Table 4: PDSA Cycle: Work Sheet

<p>Plan</p> <ul style="list-style-type: none"> • What is the objective of the test? • What do you predict will happen and why? • What change will you make? • Who will it involve (e.g. one unit, one floor, one department)? • How long will the change take to implement? • What resources will they need? • What data need to be collected? 	List your action steps along with person(s) responsible and time line
<p>Do</p> <ul style="list-style-type: none"> • Implement the change. Try out the test on a small scale. • Carry out the test. • Document problems and unexpected observations. • Begin analysis of the data. 	Describe what actually happened when you ran the test
<p>Study</p> <p>Set aside time to analyze the data and study the results and determine if the change resulted in the expected outcome.</p> <ul style="list-style-type: none"> • Complete the analysis of the data. • Compare the data to your predictions. • Summarize and reflect on what was learned. Look for: unintended consequences, surprises, successes, failures. 	Describe the measured results and how they compared to the predictions
<p>Act</p> <p>If the results were not what you wanted you try something else Refine the change, based on what was learned from the test.</p> <ul style="list-style-type: none"> • Adapt – modify the changes and repeat PDSA cycle • Adopt – consider expanding the changes in your organization to additional residents, staff, units • Abandon – change your approach and repeat PDSA cycle 	Describe what modifications to the plan will be made for the next cycle from what you learned

SIX-SIGMA: Sigma, in the current context, means standard deviation (SD). Six-sigma is statistical expression reflecting number of defects compared with perfection, zero variance. Quantitatively, six-sigma is equal to 3.4 defects per million opportunities (DPMO) or 99.9996% accuracy. If a therapeutic unit operates at six-sigma level, 3.4 medication errors are expected to occur in 1,000,000 administration. In

practice, once DPMO is known, sigma values can be looked up in statistical tables or software packages.



Figure 2: PDSA Cycle

PDSA Cycle Template

Model for Improvement: Three questions for improvement

1. *What are we trying to accomplish (aim)?*
2. *How will we know that change is an improvement (measures)?*
3. *What change can we make that will result in an improvement (ideas, hunches, theories)?*

Lean Methodology: First developed as an engineering process at the Toyota Motor Corporation. The Lean methodology is driven primarily by waste reduction. Several types of waste have been defined in Lean Methodology (Table V). Services or products are produced and delivered to the customer strictly conforming to their needs and method of delivery, nothing less nothing more.

Table 5: Lean Technology: Types of Waste

1	Overproduction or Underproduction
2	Wasted Inventory, Rework or Rejects (Ie, Assembly Mistakes)
3	Wasted Motion (ie, Poor Work Area Ergonomics)
4	Waste Associated With Waiting (i e, Patients Waiting to Be Seen For Appointments)
5	Waste From Transport or Handling (ie, Transporting Patients Unnecessarily)
6	Waste Associated With Processing (ie, Outdated Policies And Procedures)

QI in the LMIC

In High Income countries (HIC), every aspect of healthcare delivery is subject to quality scrutiny, leadership, clinical care, supply chain, contracting,

patient education and research to name a few. Implementation of such a system is resource intensive may be beyond the capacity of many low and middle income countries (LMIC).

Many LMIC and Pakistan are beginning to implement healthcare quality improvement programs. In Pakistan legislations have been enacted and healthcare commissions established. Economic realities prevent proper resourcing, and in the absence of quality culture, ownership by healthcare leaders and training of the workforce, success in bringing about quality improvement may be elusive.

In the LMIC, there are many obstacles to launch quality improvement in healthcare. Shortage of capacity places a continuous burden on healthcare services to the detriment of quality. For instance, it has been reported that two or more patients might share a bed in public hospitals. Gradually, such dangerous practices become the societal norm, an antithesis of quality. Sufficient, funding for adequate facilities is the responsibility of the politicians, senior leadership and managers. This downward spiral continues and patients suffer preventable harm and deaths.

Additionally, there is tendency to hide or underplay errors and shortcoming as an expression of loyalty to colleagues and institutions. Thus opportunity to improve is lost and preventable harm continues.

As the quality improvement literature exists in English. In non-English speaking countries, language barrier prevent understanding and internalization of quality concepts. Translating quality literature into local languages is the need of the time.

Discussion and Recommendations

Healthcare quality improvement is an emerging and evolving science that incorporated medical and behavioral sciences, statistics and management, implementation and audit, regulation and motivation, to name a few. At the core of all quality improvement lies the attitude of doing better and better. Even though any substantive coverage of quality improvement in healthcare is well beyond the scope of this review, quality improvement and patient safety can be enhanced by very little effort or formal training. Change as simple as writing the prescription legibly

or washing hands will prevent harm to the patients and save lives. Readers are strongly encouraged to begin small projects with short turnaround using PDSA work sheet in table III. Small but rapid rewards would provide impetus to do bigger projects and sustained results.

Ethical behavior and common sense form the basis of all quality activities, but they are not substitute for the subject knowledge of process improvement. The steps of bringing about quality improvement must conform to the quality standards not just empathy. All stakeholders must pull in the same direction without adding or deleting prescribed steps or a process. Unplanned variance in the process improvement are counterproductive. The role of the leadership is pivotal in rallying support for and obtaining buy in to implement quality improvement at all levels of patient care.

Work place culture is an important determinant of the outcome of quality improvement. As the cultures evolves, individual mistakes become error becomes process failure and complaints as improvement opportunities.

Healthcare quality accreditation standards are legislated by the State in order to protect the public from the harm of poor quality of care. Accreditation standards are generally kept at a minimum level. In Pakistan the provincial assemblies have legislated MSDS (minimum service delivery standards) for implementation by Healthcare Commissions. Each healthcare entity involved in direct or indirect patient care must meet their quality standards in order to continue to operate legally. These include hospitals, clinics, laboratories and practitioners. The Punjab healthcare commission implements 30 standards and 162 indicators for hospitals⁽¹⁵⁾. This number of standards is smaller for, the clinics and laboratories. Accredited institution not only deliver quality care, but also have marketing advantage. This is important for private enterprises.

Many accreditation bodies operate internationally. Joint Commission International (JCI) of the USA is one such company⁽¹⁶⁾. (joint commission international.org) JCI not only accredits healthcare institutions but also help elevate quality standard during the preparation period prior to the final inspection. JCI

services are expensive, beyond the paying capacity of most private institutions in the LMIC.

Everyone in healthcare must aspire to meet and exceed minimum standards of quality. Standards once reached, the bar should be raised for continuous improvement. As perfection can never be reached, quality improvement is considered a journey, not a destination.

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